

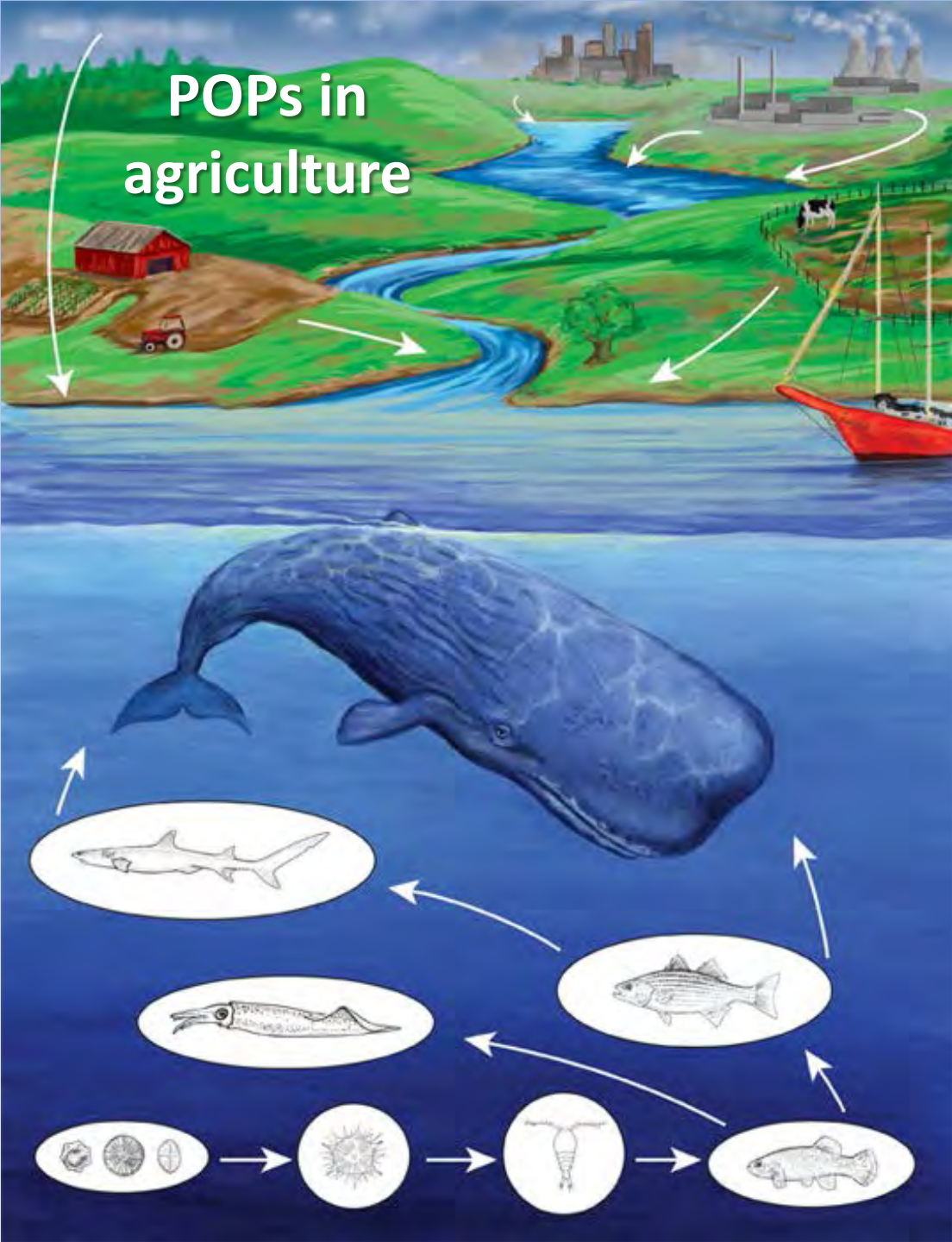
# Persistent organic pollutants in the food chain: Salmon, seabirds and marine mammals from the North-West Pacific (Russian Far East)

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Qingdao, China

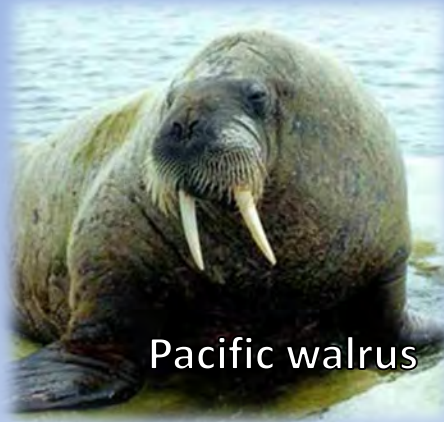


**Basic compounds of POPs and their metabolites accumulate in living organisms and have the ability to biomagnification, an increase in the concentration of organisms at higher trophic levels. Often, the final "depot" of OCPs becomes the marine ecosystems.**

# Studied marine organisms



Gray whale



Pacific walrus



Fulmar



Auklet crumb



Pacific gull



Crested auklet



Grey petrel



Pink salmon



Chinook salmon

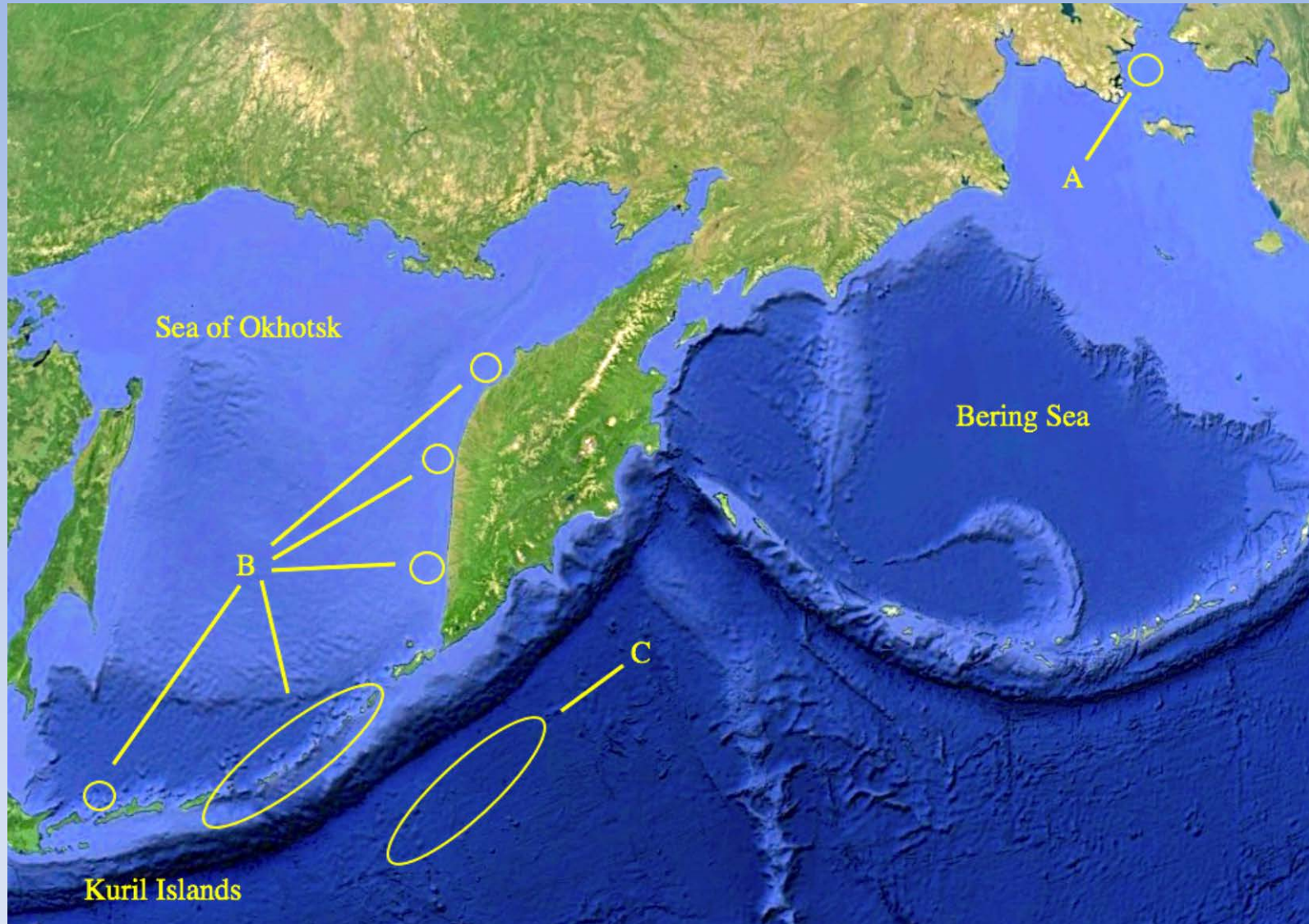


Chum salmon



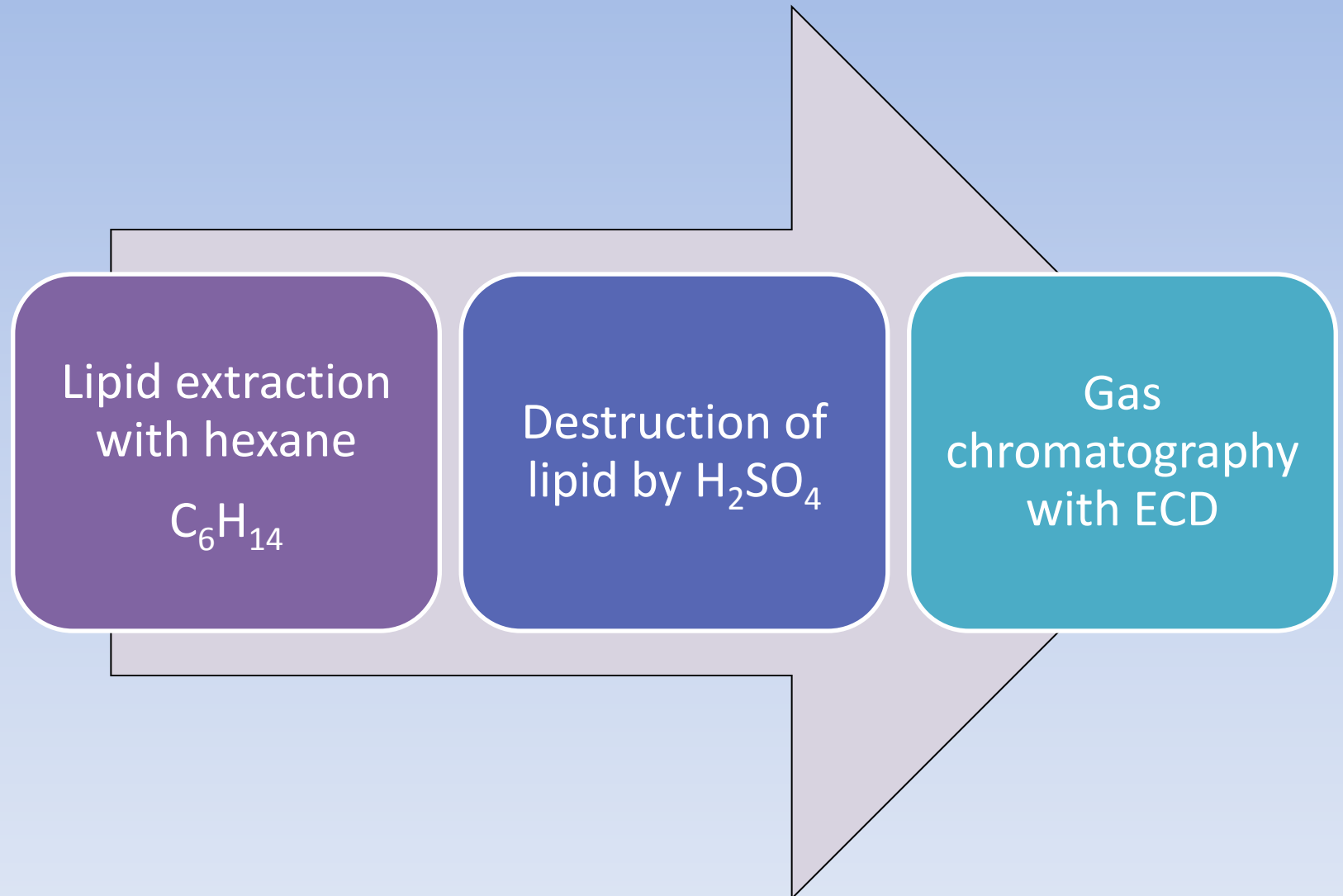
Sockeye salmon

## Map of sampling

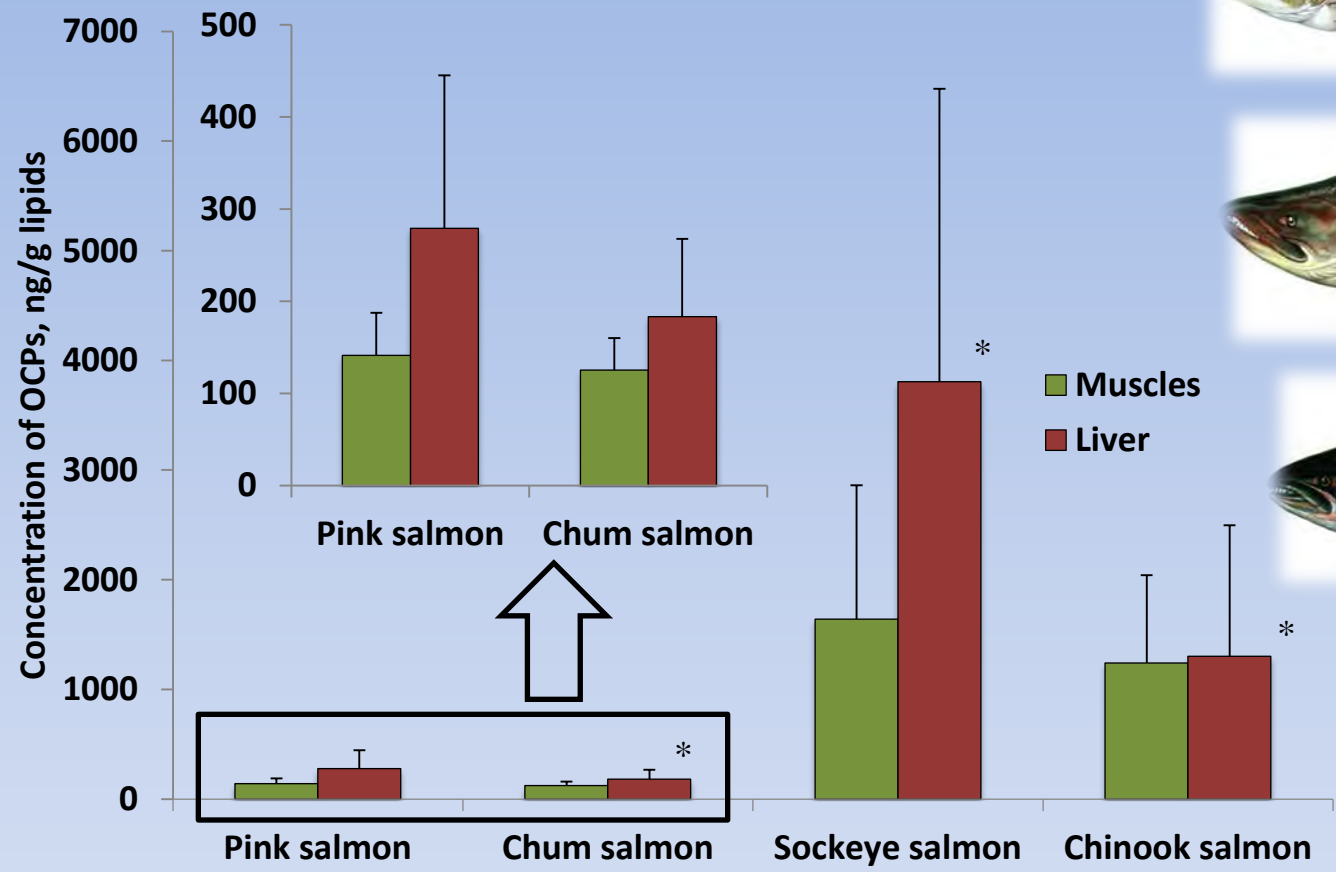


A – marine mammals, B – seabirds, C – Pacific salmon

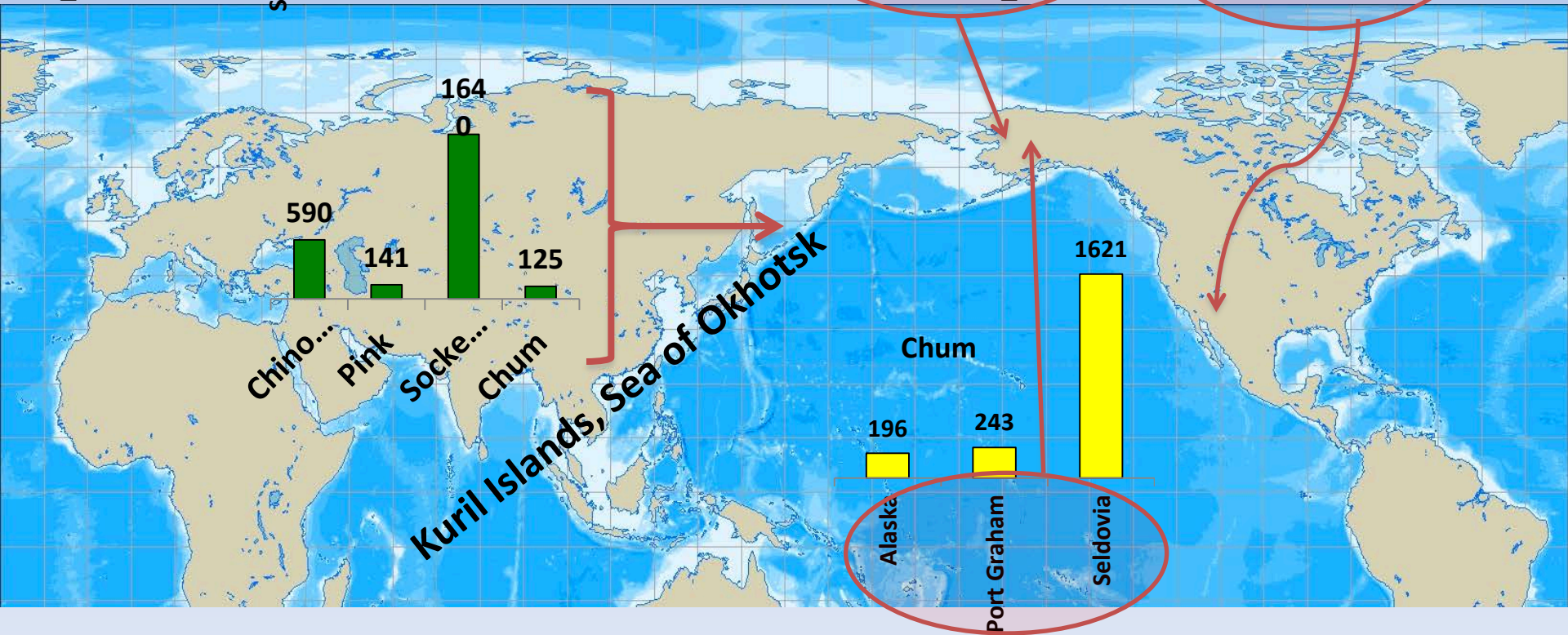
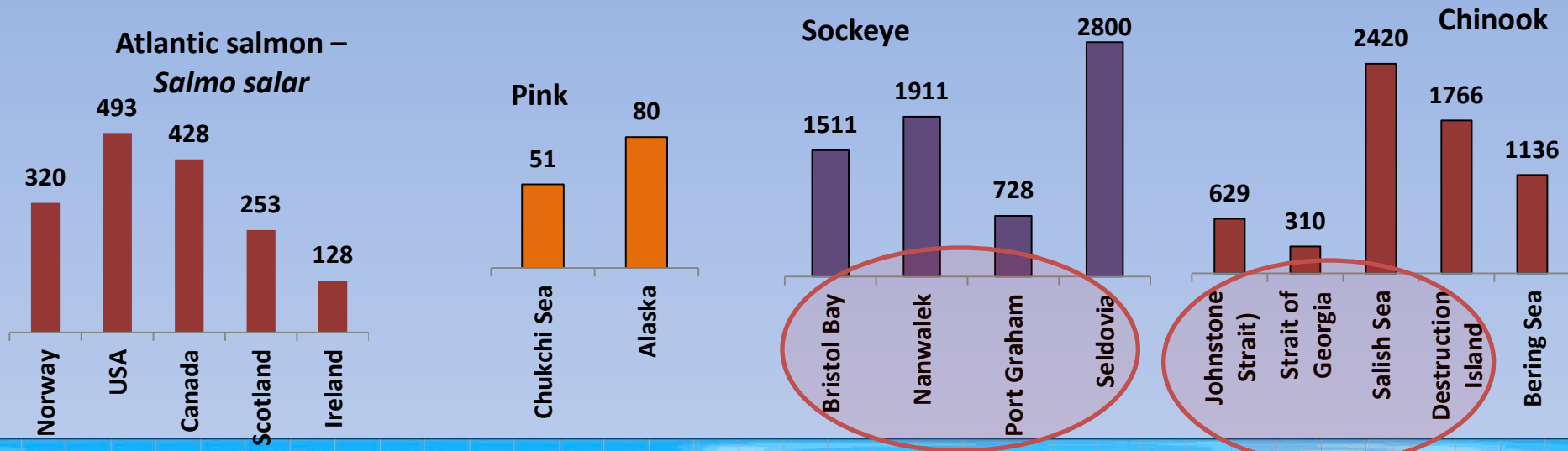
# Methods for the pesticides analysis



# Pacific salmon



Total OCPs concentration ( $\Sigma$ HCHs +  $\Sigma$ DDE) in salmon organs. The difference between OCPs concentrations in liver of certain salmon species is significant at  $p \leq 0.05$ .



**Pacific and Atlantic salmon**



**Pink**

**Average weight – 1,3 kg**

**Average body burden of POPs – 90 mcg**

## **Biotransport of OCPs by pink and chum salmon**

(Lukyanova et al., 2015)



**Chum**

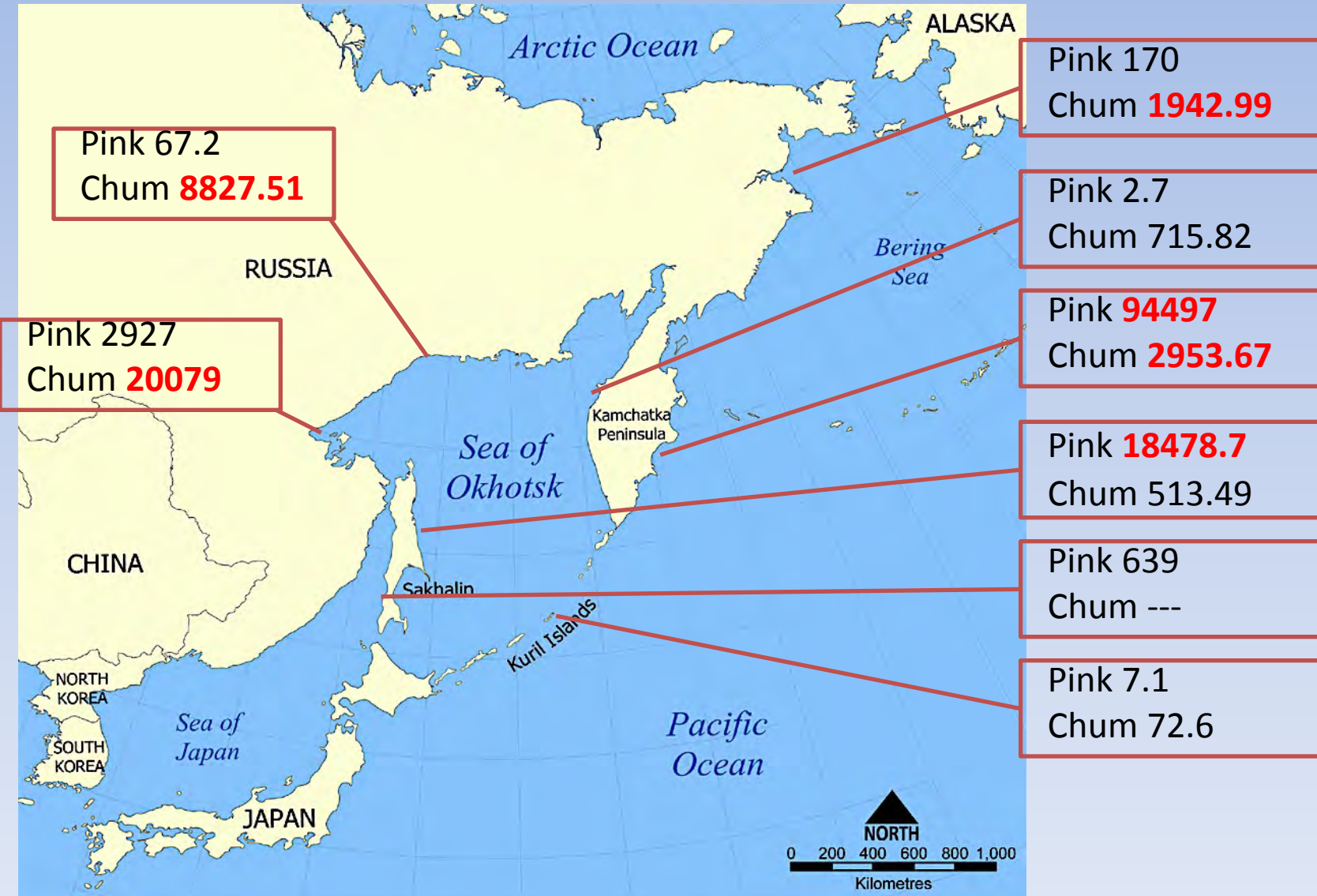
**Average weight – 3,5 kg**

**Average body burden of POPs – 640 mcg**

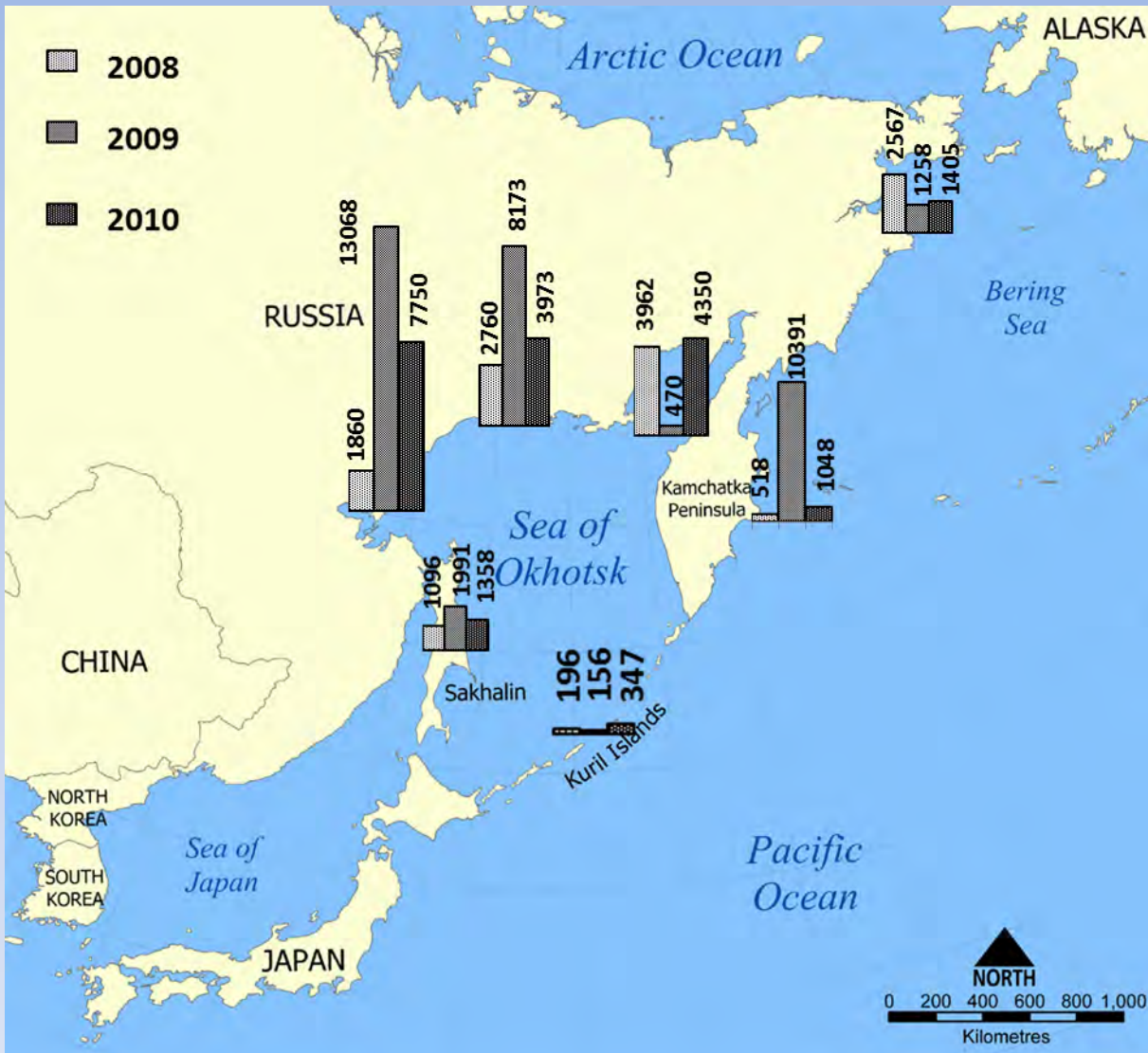


# Biotransport of OCPs by pink and chum salmon

Chum and pink salmon on the spawning to the Pacific coast of Russia in 2009  
(thousands of individuals)



# Biotransport of OCPs by pink and chum salmon

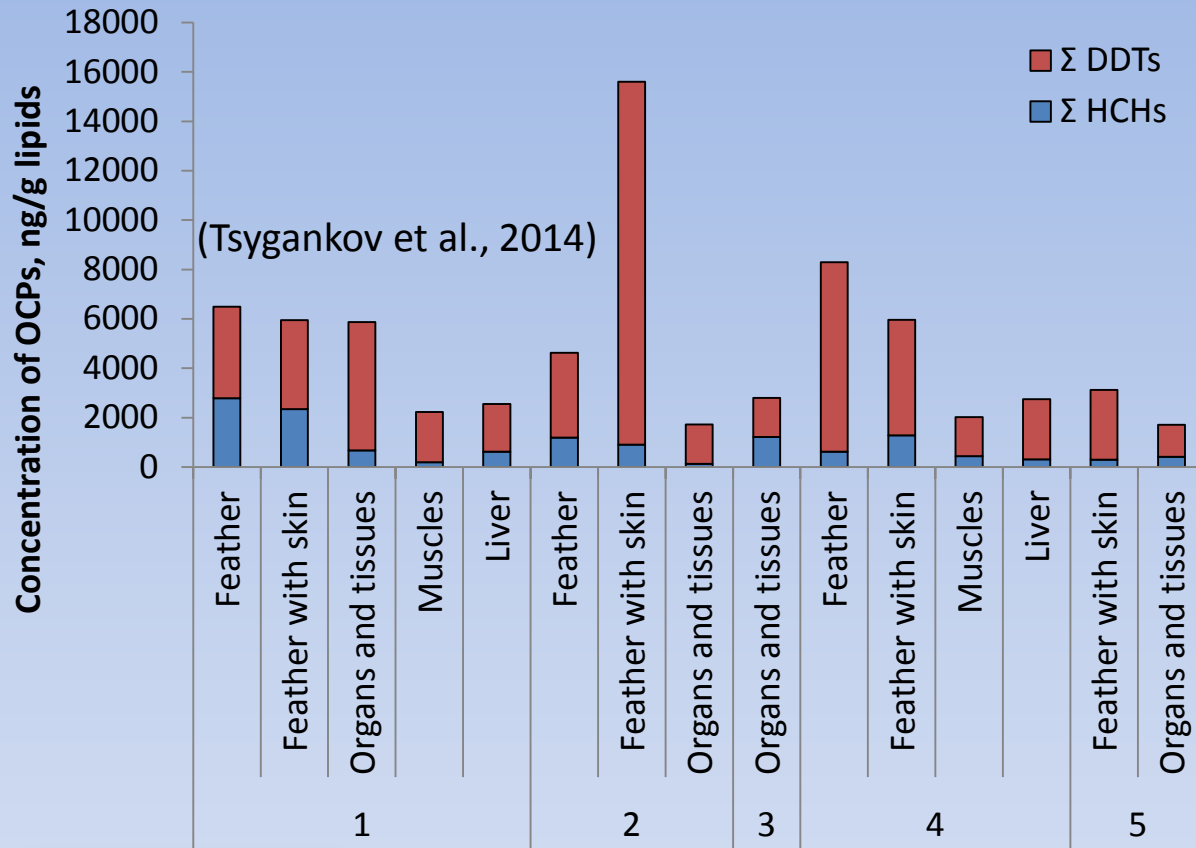


The total amount of pesticide (g) transported by the chum and pink salmon spawning areas on the Russian coast ([www.npafc.org](http://www.npafc.org))

| Years       | HCHs + DDTs, g |
|-------------|----------------|
| 2008        | 13 000         |
| <b>2009</b> | <b>35 500</b>  |
| 2010        | 20 200         |

(Lukyanova et al., 2015)

# Seabirds from the Sea of Okhotsk



1 - Fulmar



2 - Crested auklet

5 - Grey petrel

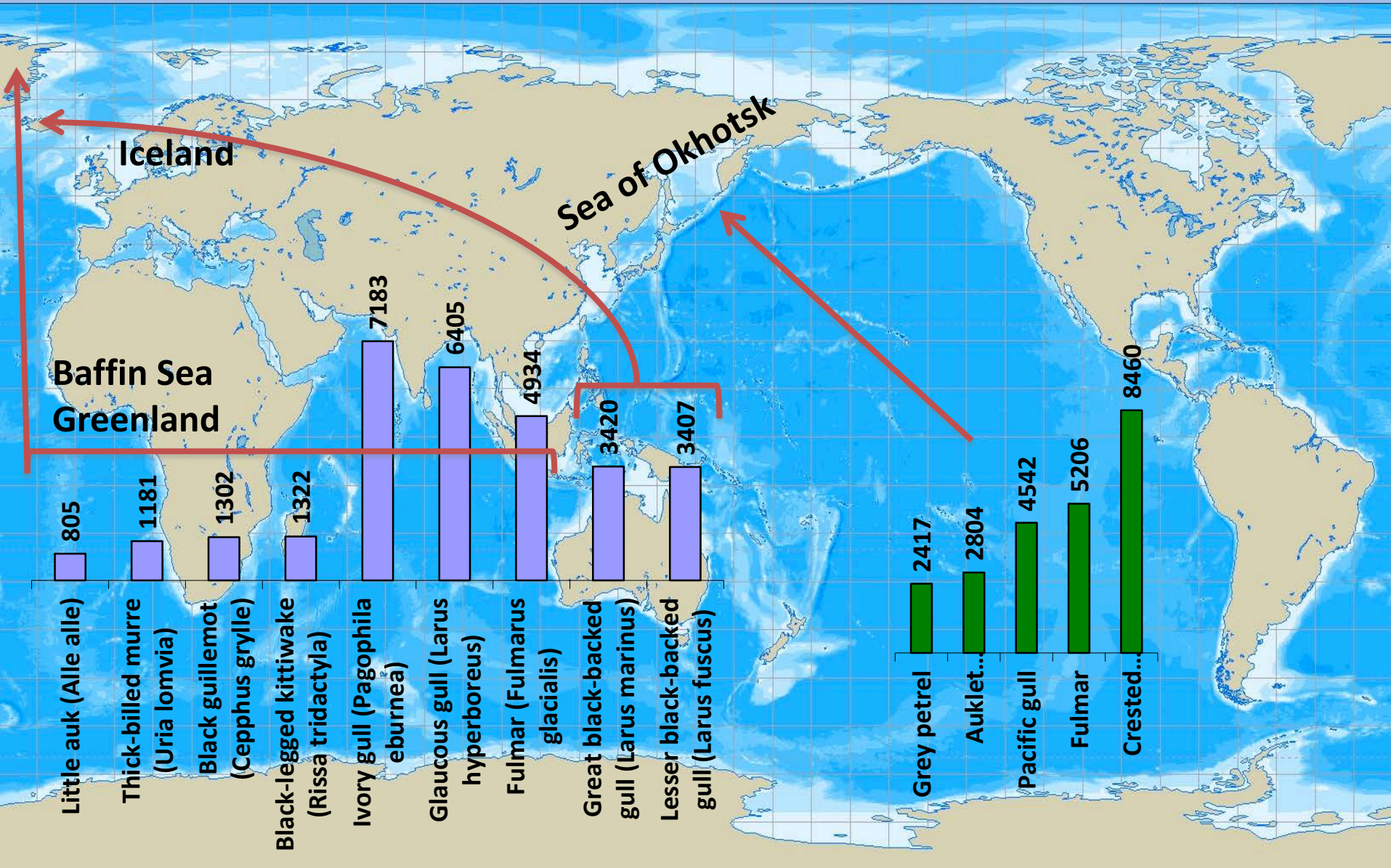


4 - Pacific gull



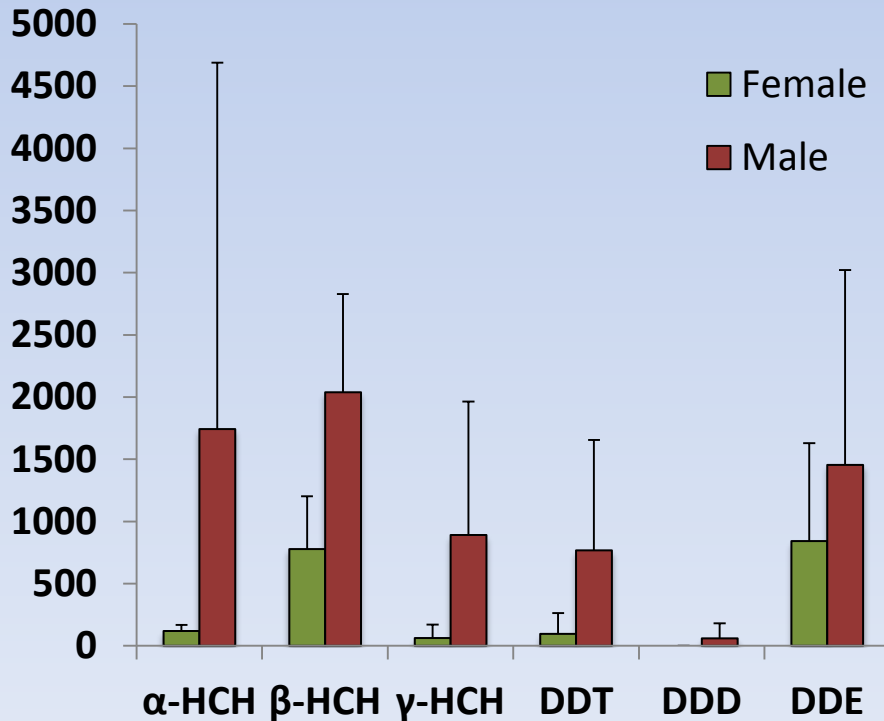
3 - Auklet crumb<sup>11</sup>

# Seabirds from the North Seas (ng/g lipids)

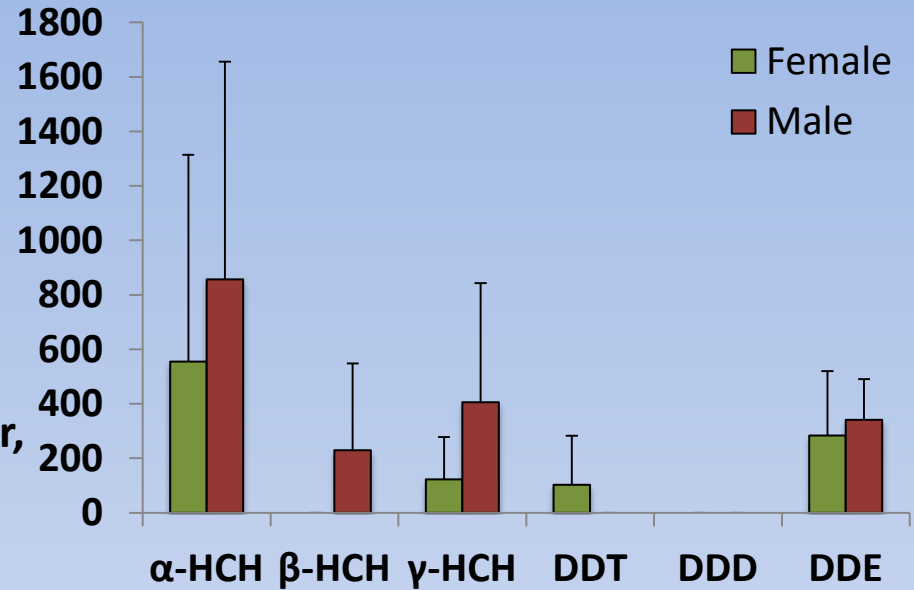


# Gray whale

The concentration of DDTs and HCHs in liver, ng/g lipids



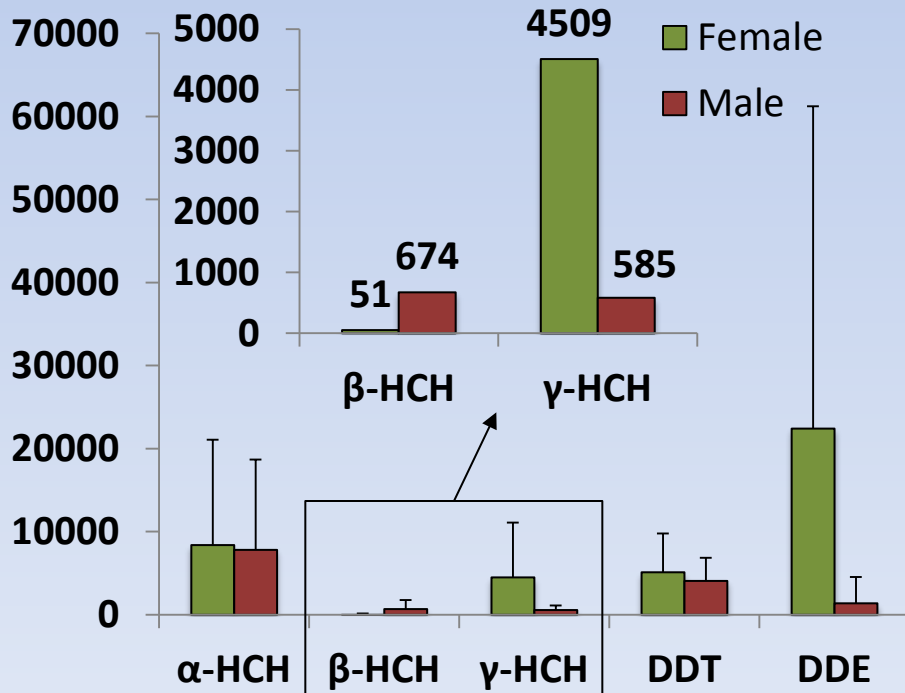
The concentration of DDTs and HCHs in muscles, ng/g lipids



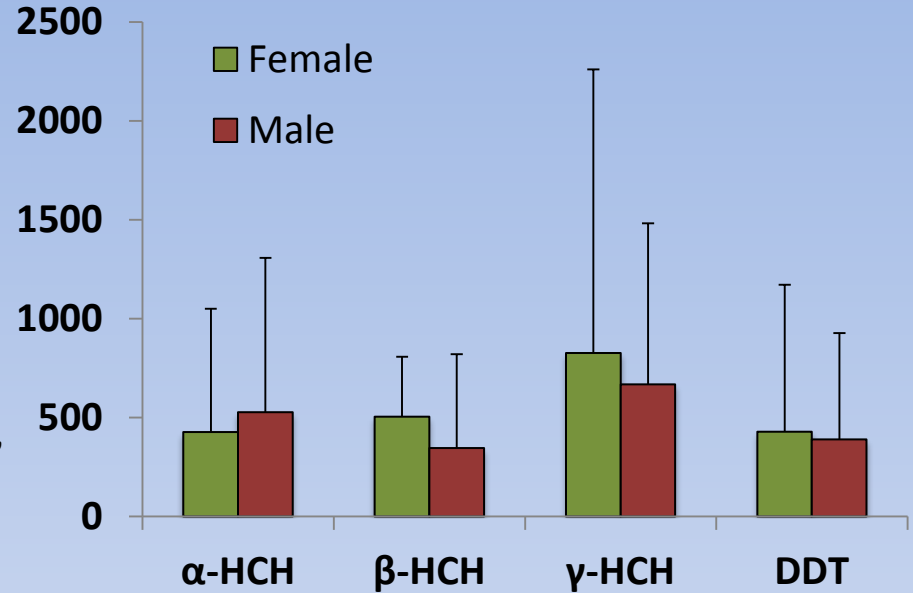
(Tsygankov et al., 2015)

# Pacific walrus

The concentration of DDTs and HCHs in liver, ng/g lipids

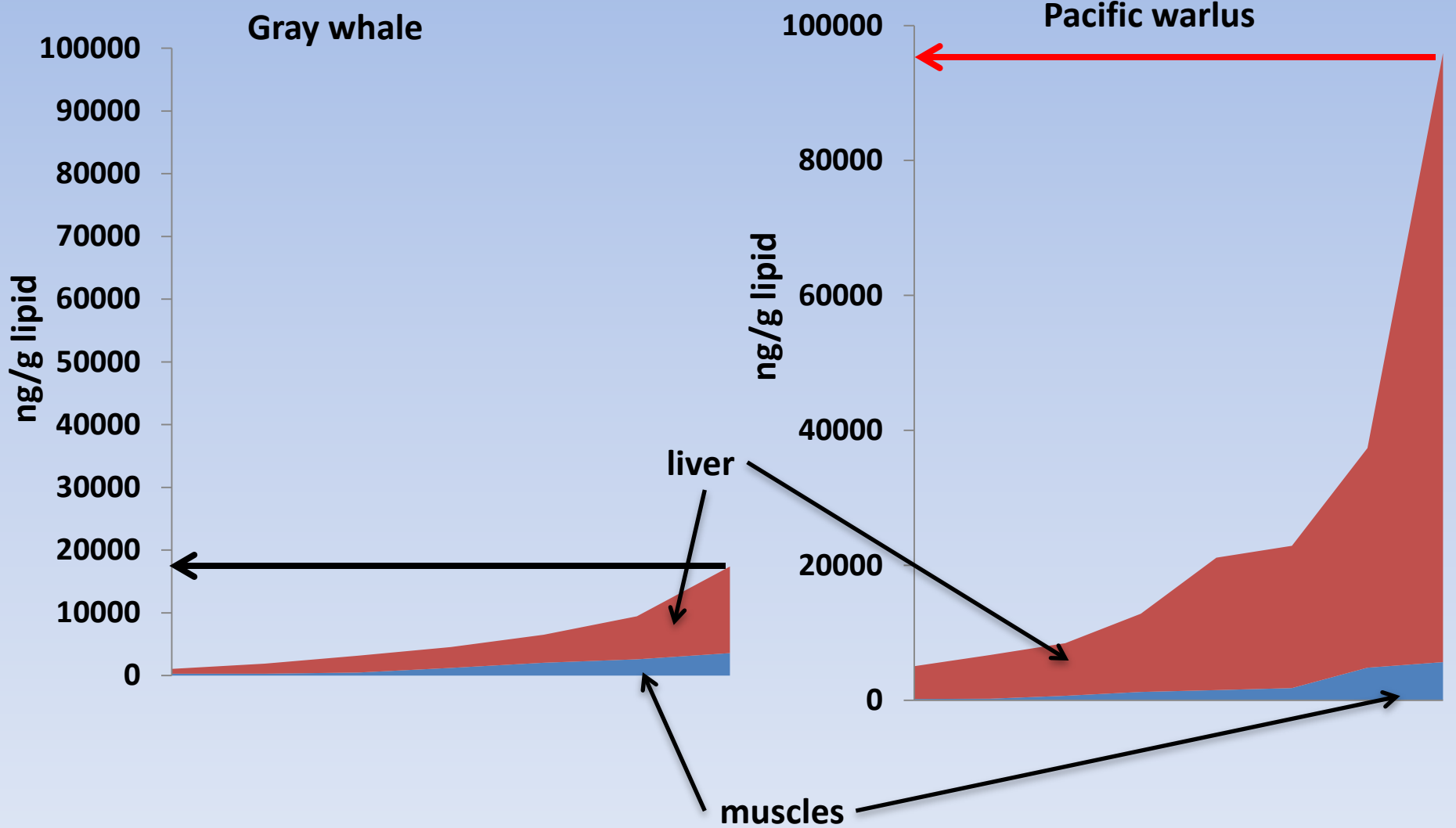


The concentration of DDTs and HCHs in muscles, ng/g lipids

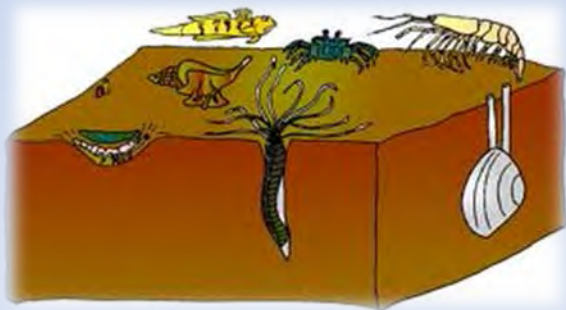
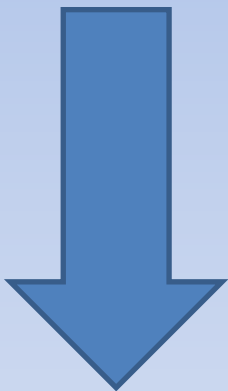


(Tsygankov et al., 2015)

# The range of total concentration of POPs in organs in analyzed marine mammals



(Tsygankov et al., 2014)



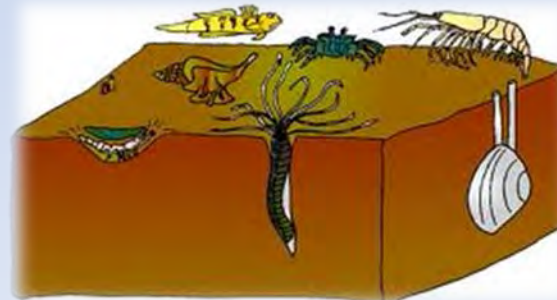
**Small benthic organisms**



**Octopus**



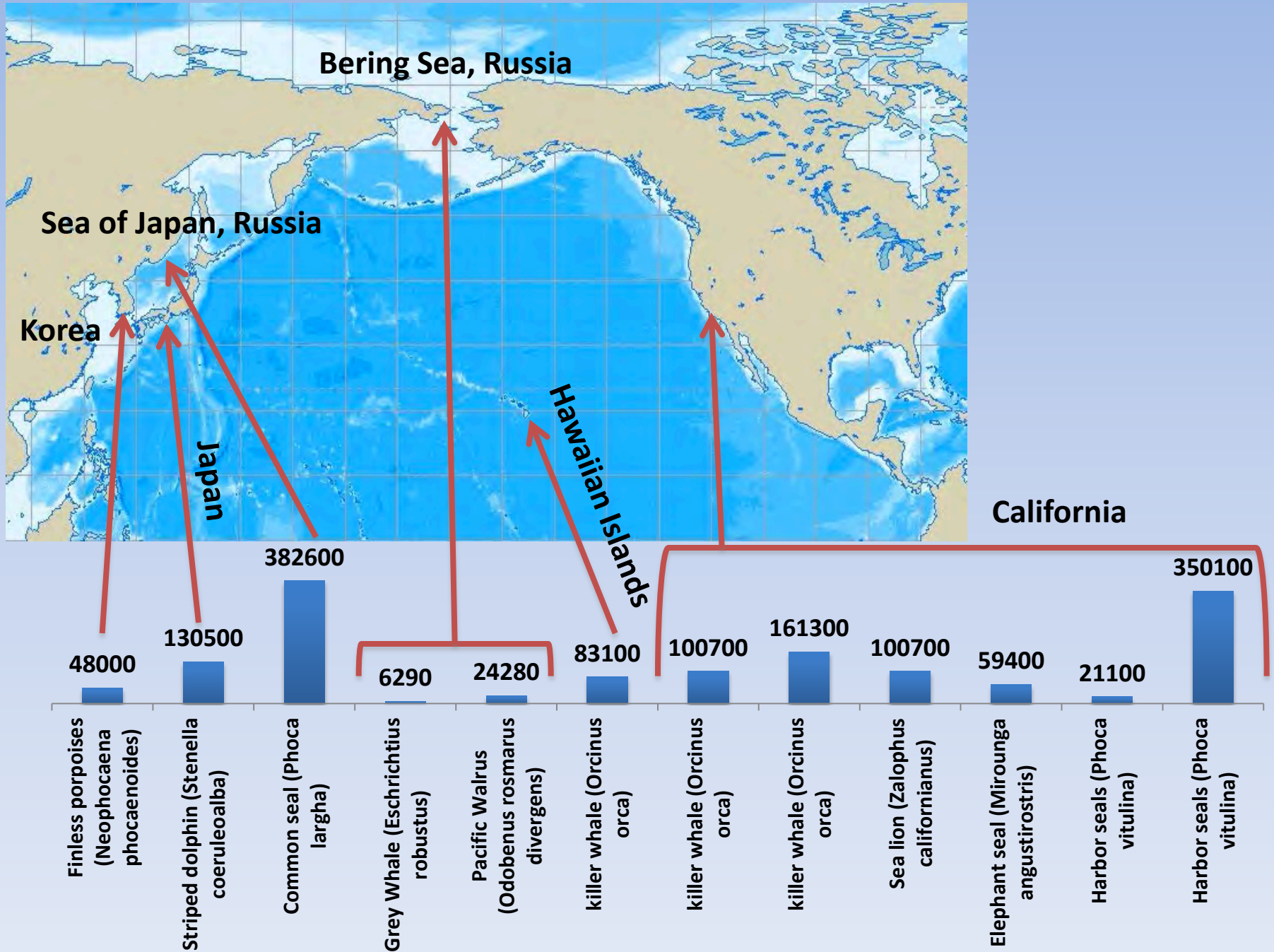
**Fish**



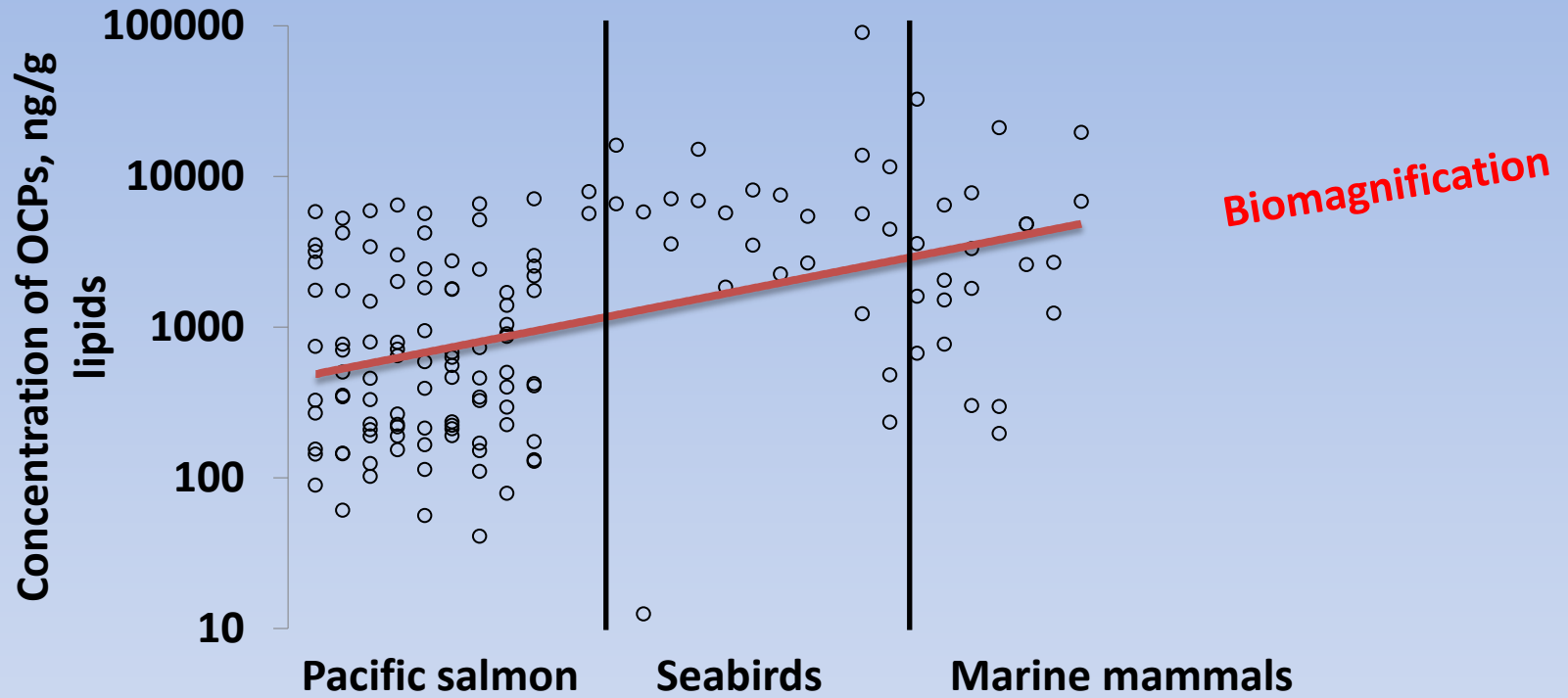
**Small benthic organisms**



# Marine mammals from the Pacific Ocean (ng/g lipids)



# Persistent organic pollutants in the food chain: Salmon, seabirds and marine mammals



# Conclusio

The presence of considerable concentrations of pesticides in marine organisms from the Sea of Okhotsk and the Bering Sea, which areas are very far from the regions of industrial activities and pesticides application demonstrate and confirm general global pesticides background existing in the world today.



**Thank you  
for your  
attention**

